

ABSTRACT OF THE DISCLOSURE

A nitride semiconductor substrate having a diameter of 10 mm or more, which has a single-layer structure composed of a nitride semiconductor layer having a basic composition represented by $\text{Al}_x\text{Ga}_{1-x}\text{N}$ (0 $\leq x \leq 1$), or a multi-layer structure comprising the nitride semiconductor layer, the mass density of the nitride semiconductor layer being 98% or more of a theoretical mass density $\rho(x)$ represented by the following general formula (1):

$$\rho(x) = \frac{4(M_x + M_N)}{\sqrt{3}a_x^2 c_x N_a} \cdot \cdot \cdot (1),$$

10 wherein $a_x = a_{\text{GaN}} + (a_{\text{AlN}} - a_{\text{GaN}})x$, wherein a_{GaN} represents an a-axis length of GaN, and a_{AlN} represents an a-axis length of AlN; $c_x = c_{\text{GaN}} + (c_{\text{AlN}} - c_{\text{GaN}})x$, wherein c_{GaN} represents a c-axis length of GaN, and c_{AlN} represents a c-axis length of AlN; $M_x = M_{\text{Ga}} + (M_{\text{Al}} - M_{\text{Ga}})x$, wherein M_{Ga} represents the atomic weight of Ga, and M_{Al} represents the atomic weight of Al; M_{N} represents the atomic weight of nitrogen; and N_a represents Avogadro's number.